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## The Upper Atmosphere Research Satellite (UARS) Ten Successful Years of Observations

*a report by James E. Johnson*

On September 12, 2001, the Upper Atmosphere Research Satellite (UARS) celebrated its tenth launch anniversary. Shortly after that, September 24, the official UARS mission ended. This 10 years of successful observations far exceeded the originally projected lifetime of 3 years. In fact, seven of the ten instruments aboard UARS are still operational. Starting on October 1, 2001, the UARS mission has focused on validating and calibrating instruments on future spacecraft. The TIMED and SAGE III satellites were launched in early December 2001; they contain the first instruments to be validated and calibrated within the context of the new UARS mission. The UARS successor mission, dubbed Aura (EOS Chemistry), is scheduled for launch in 2003. Let us review this highly successful NASA mission.

In 1976, Congress mandated NASA to undertake research of Earth's upper atmosphere. From this directive UARS was born.

UARS became the first major component in NASA's Earth Science Enterprise (formerly Mission to Planet Earth). Its goal was to measure ozone and chemical compounds found in the ozone layer that affect ozone chemistry and processes. UARS also measures winds and temperatures in the stratosphere and the energy input from the Sun. Together these help determine the chemistry, dynamics, and energy balance above the troposphere as well as the coupling between these processes and between regions of the atmosphere.

Launched on September 12, 1991, aboard the Space Shuttle Discovery (STS-48), UARS was deployed 3 days later into a 57° inclined orbit at an altitude of about 585 km. This orbit permits UARS sensors to view up to 80° latitude and also permits the UARS instruments to make measurements over the full range of local times at all geographic locations approximately every 36 days.

### The Uars Instruments: What They Are, What They Do

#### Composition and Temperature Measurements

Four UARS instruments are devoted to spectroscopically measuring the concentrations of many different chemical species and the variation of atmospheric temperature with altitude.

**CLAES** — The Cryogenic Limb Array Etalon Spectrometer measured the altitude profiles of temperature and a series of minor and trace gases important in stratospheric ozone chemistry. Measured gas species include ozone, water vapor, methane, members of the nitrogen and chlorine families, and two chlorofluorocarbons. CLAES also obtained aerosol extinction coefficients at several infrared wavelengths. CLAES successfully completed its designed lifetime of 18 months in May 1993.

**HALOE** — The Halogen Occultation Experiment uses the principle of satellite solar occultations to sound the stratosphere, mesosphere, and lower thermosphere. Through this technique HALOE measures vertical profiles of

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atmospheric ozone, hydrogen chloride, hydrogen fluoride, methane, water vapor, nitric oxide, nitrogen dioxide, aerosol extinction, and temperature. HALOE began data collection in October 1991 and is still operational.

**ISAMS** — The Improved Stratospheric and Mesospheric Sounder is an infrared pressure-modulator radiometer that observes thermal emission from Earth's limb. The instrument measured the altitude profiles of temperature, oxides of nitrogen, ozone, water vapor, methane, and carbon monoxide from the tropopause to the mesopause. ISAMS also measured aerosol extinction coefficients. Data collection ended prematurely in July 1992 after the instrument experienced technical problems.

**MLS** — The Microwave Limb Sounder uses thermal emissions in the microwave region for measuring chlorine monoxide, nitric acid, ozone, sulfur dioxide, water vapor, and atmospheric temperature in the stratosphere and mesosphere. Failure of one of three radiometers in April 1993 limited measurements of water and some ozone beyond that time. The rest of the MLS instrument remained operational until August 1999, though technically it could be switched on again in the future.

### Dynamics Measurements

Two instruments use high resolution interferometry to study the winds of the upper atmosphere by sensing the Doppler shift in light absorbed by or emitted from atmospheric molecules.

**HRDI** — The High Resolution Doppler Imager observes the emission and absorption lines of molecular and

atomic oxygen. From the Doppler shift of these lines, the horizontal wind speed and direction can be determined, while the line shapes and strengths yield information about the temperature and atmospheric species makeup. HRDI measures atmospheric wind components in the stratosphere and mesosphere. HRDI began collecting useful data starting in November 1991; the instrument is still operable.

**WINDII** — The Wind Imaging Interferometer measures the winds and temperature in the upper mesosphere and lower thermosphere. WINDII has been operational since November 1991.

### Input Energy Measurements

Four investigations obtain estimates of the energy incident on the upper atmosphere by measuring solar ultraviolet radiation and the flux of charged particles from Earth's magnetosphere.

**PEM** — The purpose of the Particle Environment Monitor is to determine both the global input of charged particle energy into Earth's stratosphere, mesosphere, and thermosphere and the predicted atmospheric responses. Three separate boom mounted sensors measure electrons, protons, and the strength of Earth's magnetic field in the vicinity of the UARS spacecraft. PEM also includes a 16-element array of x-ray detectors to provide global images and energy spectra of bremsstrahlung x-rays produced by electrons precipitating into the upper atmosphere. PEM is still operational.

**SOLSTICE** — The Solar-Stellar Irradiance Comparison Experiment has been providing daily measurements of solar UV spectral irradiance in the 118 to 425 nm wavelength region. SOLSTICE uses a novel approach of using stable bright blue stars for inflight cali-

bration. The instrument started making measurements in October 1991 and is still operable.

**SUSIM** — The Solar Ultraviolet Spectral Irradiance Monitor is the second instrument on UARS making daily measurements of solar UV spectral irradiance. The SUSIM spectral range is from 110 to 411 nm. SUSIM's measurements complement those from SOLSTICE, and the instrument has been operational since October 1991.

**ACRIM II** — The Active Cavity Radiometer Irradiance Monitor flew previously on the Solar Maximum Mission satellite from 1980 to 1989. The goal of the second ACRIM is to continue monitoring the total solar irradiance, or solar constant. Note that ACRIM II does not fall under the UARS project but was flown as an instrument of opportunity. For more information see the ACRIM home page.

<http://acrim.jpl.nasa.gov/>

### UARS Products

As cited in the UARS 1997 brochure, *Understanding our Atmosphere*, in its 10 years UARS has provided many important discoveries. Among them,

- the first global maps of chlorofluorocarbons (CFC-11 and CFC-12) from space
- seasonal mapping of chlorine radicals (ClO) and reservoirs (HCl, ClONO<sub>2</sub>) in the lower stratosphere
- trace gas trends showing vertical transport of H<sub>2</sub>O in the tropical stratosphere
- the first direct measurements of stratospheric and mesospheric winds from space
- comprehensive mapping of volcanic aerosol layers following the 1991 eruption of Mt. Pinatubo

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An expanded and updated version of *The Global Scanner* is available on our Web site at

[http://daac.gsfc.nasa.gov/DAAC\\_DOCS/Newsletter](http://daac.gsfc.nasa.gov/DAAC_DOCS/Newsletter)

News of noteworthy events that occur in the interim between publication of this issue and the next will be posted there along with goodies we feel may be helpful to our users. Be sure to visit the site from time to time.

- high resolution, long-term measurements of the solar UV spectrum
- clarification of the role of energetic particles in the chemistry of the stratosphere
- global measurements of atmospheric tidal wind fields.

The Goddard DAAC is the archive for the primary science products labeled level 3AL and 3AT. All UARS level 3AT data products from each instrument use the same vertical profile grid (1/6 scale height between levels), and the data are mapped to the same point every 65 seconds (approximately 495 km) along the orbit track. The level 3AL data are derived from the level 3AT data, and are plotted to 4° increments from -80° to +80° of latitude. These data can be ordered by going to

<http://daac.gsfc.nasa.gov/data/dataset/UARS/>

There are also two correlative data products available, one from the National Meteorological Center (NMC), now called the National Center for Environmental Prediction (NCEP), and the other from the U.K. Meteorological Office (UKMO). We also archive level 2 data from HALOE and some of PEM. Some ACRIM II data are included in our interdisciplinary data collection, but for information concerning the complete data set please see

<http://acrim.jpl.nasa.gov/>

or

<http://www.acrim.com/>

## The Future

Although the primary UARS mission ended September 24, 2001, seven of the ten instruments are still functioning, and six are continuing measurements within the context of validating and calibrating instru-

ments on future spacecraft. The follow-on mission to UARS is the EOS chemistry mission, Aura (see <http://aura.gsfc.nasa.gov/>). The Aura spacecraft will include four instruments dedicated to measuring the composition of this planet's atmosphere. The instruments include a second and improved Microwave Limb Sounder (MLS), the High Resolution Dynamics Limb Sounder (HRDLS), the Ozone Monitoring Instrument (OMI) and the Tropospheric Emission Spectrometer (TES). The data from the first three instruments will be archived at the Goddard DAAC, while the data

from the TES instrument will be archived at the Langley DAAC. Aura's launch is scheduled for the end of June 2003.

A follow-on SOLSTICE instrument will fly on the Solar Radiation and Climate Experiment (SORCE) satellite scheduled for launch in July 2002 (<http://lasp.colorado.edu/sorce/>). In addition to the SOLSTICE instrument, the SORCE satellite will carry the Total Irradiance Monitor (TIM), the Spectral Irradiance Monitor (SIM), and the Extreme UV Photometer System (XPS). All of the SORCE data products will be archived at the Goddard DAAC.

### CHIEF DATA SETS SERVICED BY THE UPPER ATMOSPHERE DATA SUPPORT TEAM

UARS Instrument Products (except ACRIM) from October 1991 to September 2001.

Total Ozone Mapping Spectrometer (TOMS) starting with November 1978 to July 1, 2000 (from TOMS on NIMBUS-7, Meteor 3, ADEOS, and Earth Probe TOMS). *Note:* The QuikTOMS launch on September 21, 2001, failed.

Global Ozone Monitoring Experiment (GOME). GOME data from the ERS-2 spacecraft consist of daily, interpolated, global coverage of total ozone integrated over the depth of the atmosphere. These data are mirrored at the Goddard DAAC courtesy of the German Remote Sensing Data Center (DFD/DLR).

SSBUV (Shuttle Solar Background Ultraviolet, SSBUV 1, 2, 3, & 4). The SSBUV data contain total ozone and ozone profiles measured from space shuttle flights.

**Acknowledgement:** The author thanks Dr. Charles Jackman for reviewing this article and suggesting changes.

## References

The Upper Atmosphere Data Support Web page where the data and additional information about data sets listed above can be accessed:

[http://daac.gsfc.nasa.gov/CAMPAIGN\\_DOCS/ATM\\_CHEM/](http://daac.gsfc.nasa.gov/CAMPAIGN_DOCS/ATM_CHEM/)

The GES DAAC Home Page where additional global change data sets and

associated information held at the Goddard Earth Science DAAC may be found:

<http://daac.gsfc.nasa.gov/>

The UARS home page where additional UARS information and links to the individual UARS instrument teams may be found:

<http://umpgal.gsfc.nasa.gov/>

The TOMS Home Page where links to additional TOMS data products, information, and the TOMS Science Team may be found:

<http://toms.gsfc.nasa.gov/>

## New Data Products General News People in the News



as reported by  
George Serafino, James Acker, Bill Teng, and others in the Data Support Teams

### NEW DATA PRODUCTS & SERVICES

Detailed information about the archived data holdings at the GES DISC can be found at

<http://daac.gsfc.nasa.gov>

In this section we just emphasize important new happenings concerning our data holdings. These are arranged by data categories.

### ATMOSPHERIC CHEMISTRY

*Ozone and other trace gas compositions, dynamics, and energy interactions of the upper atmosphere.*

The official UARS mission ended on September 24. The last of the data from this valuable 10-year mission is now available to the public. For additional details see this issue's feature article, "The Upper Atmosphere Research Satellite, Ten Successful Years of Observations."

**Name Change** — Please note that the name of the old GES DAAC's Atmospheric Chemistry Web site has been changed to Upper Atmosphere Data Support. However, on the GES DAAC's home page, the original name, Atmospheric Chemistry, was still displayed at the time of this writing. The GES DAAC's home page will in time reflect this change, but it is under configuration control so it takes longer to change it. The name

change was made to reflect the official description of the team's function.

### ATMOSPHERIC DYNAMICS

*3-D dynamic and thermodynamic state of the Earth-atmosphere system, from satellite measurements and assimilation systems.*

The GES DAAC is busy preparing to process and archive Aqua MODIS and AIRS data and data products. The Aqua satellite is scheduled to launch in spring 2002. As usual, the science teams will review the data quality for some months before the data are released to the public. Atmospheric Infrared Sounder (AIRS) information is available at [http://daac.gsfc.nasa.gov/CAMPAIGN\\_DOCS/atmospheric\\_dynamics/ad\\_data/airs.html](http://daac.gsfc.nasa.gov/CAMPAIGN_DOCS/atmospheric_dynamics/ad_data/airs.html)

### HYDROLOGY

*Global precipitation, its variability, and associated latent heating, important for studying the global hydrological cycle, climate modeling, and applications.*

To extend the lifetime of the Tropical Rainfall Measuring Mission (TRMM), its average satellite altitude was boosted from 350 km to 402.5 km. The boost was performed in six stages starting August 7 and ending August 24, 2001. The TRMM science team has had to modify the data product processing programs to account for the chang-

es in the satellite orbit parameters and the ground resolution of the instruments. All postboost TRMM data products have now been released to the public.

For a summary of the TRMM pre- and postboost swath widths and resolutions and additional information about the TRMM boost, please see

[http://lake.nascom.nasa.gov/data/dataset/TRMM/trmm\\_boost.html](http://lake.nascom.nasa.gov/data/dataset/TRMM/trmm_boost.html)

Caveats associated with the postboost TRMM Precipitation Radar products are detailed in

[ftp://lake.nascom.nasa.gov/data/TRMM/Documentation/TRMM\\_Boost\\_PR\\_Caveats.html](ftp://lake.nascom.nasa.gov/data/TRMM/Documentation/TRMM_Boost_PR_Caveats.html)

All TRMM data, pre- and postboost, are still accessible from

[http://lake.nascom.nasa.gov/data/dataset/TRMM/01\\_Data\\_Products/01\\_Orbital/index.html](http://lake.nascom.nasa.gov/data/dataset/TRMM/01_Data_Products/01_Orbital/index.html)

Six new TRMM standard ground validation (GV) products have been released for the Kwajalein validation site. These products, named with a UW suffix (e.g., 2A53UW), are based on the algorithm developed by the GV team members at the University of Washington and use the same raw input as that for the original TRMM standard GV products. More information can be found at

[ftp://lake.nascom.nasa.gov/data/TRMM/Documentation/TRMM\\_UWGV\\_Document.pdf](ftp://lake.nascom.nasa.gov/data/TRMM/Documentation/TRMM_UWGV_Document.pdf)

### MODIS DATA SUPPORT

*Radiance data and auxiliary information such as geolocation and cloud mask, atmospheric profiles, and higher level ocean color data.*

On-demand subsetting is now available for those wishing just subsets of the MODIS archive data files.

- MODIS L1B on-demand channel subsetting capability in local DAAC user interface; both HDF-EOS and flat binary output options are currently available

- MODIS oceans L3 parameter sub-setting capability in DAAC user interface
- filtering by attribute (e.g., day or night flag) now extended to ocean and atmospheres Level 2 products in search-and-order interface.

The GES DAAC and its MODIS Data Support Team (MDST) are busy preparing to handle Aqua-MODIS data. The Aqua satellite is scheduled to launch in spring 2002. As it becomes available, information concerning the Aqua-MODIS and its data will be posted at the MDST Web site

[http://daac.gsfc.nasa.gov/CAMPAIGN\\_DOCS/MODIS/](http://daac.gsfc.nasa.gov/CAMPAIGN_DOCS/MODIS/)

As usual, the MODIS Science Team will carefully review the Aqua-MODIS data quality for a while before it is released to the public.

## OCEAN COLOR

*Remote sensing ocean color data used to investigate ocean productivity, marine optical properties, and the interaction of winds and currents with ocean biology.*

Two new *Science Focus!* articles were completed and promoted to the Web

- Turbidity—Through a Water Column, Darkly
- Fluorescence—That Healthy Glow.

The *Science Focus!* URL is

[http://daac.gsfc.nasa.gov/CAMPAIGN\\_DOCS/OCDS/science\\_focus.html](http://daac.gsfc.nasa.gov/CAMPAIGN_DOCS/OCDS/science_focus.html)

OCTS ocean color data are now available with calibration and format similar to the SeaWiFS Level 2 and Level 3 data file format and are compatible with the SeaWiFS Data Analysis System (SeaDAS) data processing software package. The ingest of the Ocean Color and Temperature Scanner (OCTS) data was completed December 10. The distribution system was tested and the

data were ready for distribution by December 18, 2001. OCTS flew on the Japanese Advanced Earth Observing Satellite (called ADEOS prelaunch, MIDORI postlaunch), and the data set covers November 1996 to June 1997 when MIDORI failed. The SeaWiFS and SIMBIOS projects collaborated with NASDA (the Japanese Space Agency) to re-process the OCTS ocean color data (not the sea surface temperature data) into the SeaWiFS file format and to calibrate it against the SeaWiFS calibration standards.

The SeaWiFS Data External Browser was received and is being sent out to users who requested it. This browser is a set of CD-ROMs that allows users to view browse images and order files on personal computer systems independent of a Web browser. It is primarily intended for overseas users with slow Internet connections.



Researchers may also find useful products in our other important data set collections.

## FIELD EXPERIMENTS

*Aircraft and ground based measurements of meteorological variables designed to improve science algorithms and validate satellite-derived data products.*

## INTERDISCIPLINARY

*Global land, ocean, and atmospheric parameters mapped to uniform spatial and temporal scales for basic research and applications studies.*

## LAND BIOSPHERE

*Long time-series vegetation and thermal infrared brightness temperature data sets for global change research.*

For more details about the GES DISC data holdings and to order data see our Home Page or contact us by eMail, phone, or fax.

<http://daac.gsfc.nasa.gov/>

For MODIS User Services  
eMail: [daac\\_usg@gsfcsrvr4.gsfc.nasa.gov](mailto:daac_usg@gsfcsrvr4.gsfc.nasa.gov)  
phone: 301-614-5473  
fax: 301-614-5304  
For other products' User Services  
eMail: [daacuso@daac.gsfc.nasa.gov](mailto:daacuso@daac.gsfc.nasa.gov)  
phone: 301-614-5224 or 1-877-422-1222  
fax: 301-614-5304

## GENERAL NEWS

### DISC Happenings

*System Execution Statistics* — As of November 30, 2001, archived thus far are

- over 30 T-bytes of TRMM, SeaWiFS, CZCS, TOMS, TOVS, UARS, and AVHRR data
- over 416 T-bytes of MODIS products.

*Science Integration News* — Both the Terra MODIS forward processing and reprocessing efforts at the GES DAAC are now being done on the Simple, Scalable, Script-Based Science Processor Mission (S4PM) software developed by the GES DAAC. The AIRS science data processing to be done at the GES DAAC is also being moved to S4PM. The integration and testing of the AIRS science software is in progress.

*Data Support News* — Work continues with Nancy Maynard, Associate Director of Environment and Health (E&H), Code 900, to provide NASA remote sensing data to Pennsylvania State University (PSU) for potential use in monitoring and predicting West Nile virus outbreaks. This work is presently in the product development stage. The GES DISC group is recasting MODIS high resolution NDVI and land surface temperature (LST) products (among others) into a suitable projection and various Geo-

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graphical Information System (GIS) compatible image formats. The MODIS NDVI and LST data being used are obtained from EDC (the Earth Resources Observation Systems (EROS) Data Center). Once the product requirements are finalized and the processing of the data is automated the products will feed into the GES DISC Remote Sensing Information Partners system. Several people are involved in this program, including George Serafino, John Qu, Nathan Pollack, Bill Teng, Dimitar Ouzounov, and Gilberto Vicente. Gilberto acts in the capacity of liaison between the Code 900 E&H office and the GES DAAC.

**System Engineering News** — The second TRMM data mining campaign began August 29 with seven data mining algorithms that requesters submitted. A progress report shows that in 2.5 months over 3 TB of TRMM data products were extracted from the DAAC archive and processed. Seven data mining algorithms produced 123.7 GB of products for the requesters. That's a reduction in distribution size of about 25 to 1!

**Steve Kempler** continues to play an active role in the Earth Sciences Enterprise Federation

- as committee chair, leading monthly Products and Service (P&S) Standing Committee teleconferences
- participating in MODIS and technology cluster activities
- participating in Federation Executive Committee activities
- leading the development of the *Federation Products & Services* brochure.

## Awards

**Icing on the Cake** — In May 2001 the GES DISC Data Support and Operations groups led by George Serafino and Gary Alcott received a Quarterly Customer Service Excellence Award. Last December the awards committee reviewed the awards given out and selected a few for an additional "Best of The Best" award. The GES DISC is proud that the groups led by Serafino and Alcott received one of these.

## Publications & Presentations

The Hydrology Data Support Team sent a representative to the TRMM Science Team meeting in Ft. Collins, CO, October 29–November 1; the TRMM project scientist announced the availability of the DAAC data mining system.

The Atmospheric Data Support Team presented a poster at the AIRS Science Team meeting, November 7–8, in Pasadena, CA, entitled "The Role of AIRS Data Support and Services at the GES DISC DAAC."

**AGU Fall Meeting** — The abstracts of presentation papers that GES DISC personnel authored or coauthored for the American Geophysical Union (AGU) 2001 Fall Meeting, December 10–14, 2001, in San Francisco, were published as a supplement to *EOS, Transactions, American Geophysical Union*, 82:47, November 20, 2001. All were poster presentations. They included

"A New Multifunctional GES DAAC Data Processing and Visualization Tool for Land, Ocean and Atmosphere MODIS Data," by Louis Gonzales and Christine Derroo of the University of Lille Labo-

ratoire d'Otique Atmospherique, Lille, France, and Dimitar Ouzounov, Suraiya Ahmad, James Koziana, Greg Leptoukh, Andrey Savtchenko, George Serafino, A. K. Sharma, and John Qu of the GES DISC, p. F88.

"Field Experiment Data Support at the Goddard DAAC," by Patricia L. Hrubik, Runhua Yang, Suraiya Ahmad, Long Chiu, William Teng, Zhong Liu, George Serafino, Hualan Rui, John Bonk, and Nathan Pollack, p. F88.

"Anatomy of TRMM Science Data Support at the Goddard DAAC," by William Teng, George Serafino, Long Chiu, Hualan Rui, John Bonk, Patricia Hrubik, Runhua Yang, Suraiya Ahmad, Zhong Liu, Bing Zhang, Nathan Pollack, Gilberto Vicente, A. K. Aharna, and Li Lu, p. F88.

"GEOS-Terra Data Assimilation System Data Support at the Goddard Earth Sciences DISC DAAC," by Sunmi Cho, Jianchun Qin, and George Serafino, p. F89.

"Statistics of TRMM Data Archive and Distribution at the Goddard DAAC," by Hualan Rui, Bill Teng, Long Chiu, George Serafino, Patricia Hrubik, and John Bonk, p. F90.

"MODIS Data Products Management Tools and Services at the GES DAAC," by Awdhesh K. Sharma, S. Ahmad, P. Eaton, J. Koziana, G. Leptoukh, D. Ouzounov, A. Savtchenko, G. Serafino, M. Sikder, and B. Zhou, p. F309.

"Reprocessing of the OCTS Global Dataset, a Collaborative Effort Between NASDA and the NASA SIMBIOS Project," by Tasuku Tanaka (NASDA, EORC, Tokyo), Bryan A. Franz (SIMBIOS and SeaWiFS Projects, NASA GSFC), James G. Acker (GES DAAC),

Ichio Asanume (NASDA, EORC, Tokyo), Sean Baily (SIMBIOS and SeaWiFS projects, NASA GSFC), Robert E. Eplee (SeaWiFS project, NASA GSFC), Hajime Fukushima (Tokai University, Japan), Joel M. Gales (SIMBIOS and SeaWiFS projects, NASA GSFC), Stephane Maritorena (ICESSE, University of California at Santa Barbara), Yasushi Mitomi & Hiroshi Murakami (both of NASDA, EORC, Tokyo), John E. O'Reilly (NMFS NOAA, Narragansett, RI), Suhung Shen (GES DAAC), Paul Smith (SIMBIOS and SeaWiFS projects, NASA GSFC), Mengua Wang (U. of Maryland, Baltimore Co., Code 970.2, NASA GSFC), John Wilding, and Bill Woodford (SIMBIOS and SeaWiFS projects, NASA GSFC), p. F660.

“MODIS Ocean Color, SST, and Primary Productivity Products at the NASA Goddard Earth Sciences DAAC,” by James Koziana, Gregory Leptoukh, Andrey Savtchenko, George Serafino, and A. K. Sharma, p. F675.

The MODIS presentations may be viewed at

[http://daac.gsfc.nasa.gov/CAMPAIGN\\_DOCS/MODIS/documentation/posters/index.shtml](http://daac.gsfc.nasa.gov/CAMPAIGN_DOCS/MODIS/documentation/posters/index.shtml)

**Publication Update** — This publication was mentioned earlier, but a complete reference was not then available, “KDD Services at the Goddard Earth Sciences Distributed Active Archive Center,” by Christopher Lynnes and Robert Mack. In *Data Mining for Scientific and Engineering Applications*. Grossman, R.L., Kamath, C., Kegelmeyer, P., Kumar, V., and Namburu, R. R., eds., Kluwer Academic Publishers, 2001, pp. 165–181.

## PEOPLE IN THE NEWS

### **Personality Sketch: Bruce Vollmer, GES DISC Science Integration Lead**

Bruce has been associated with Goddard Space Flight Center for 17 years. From 1984–1990 he worked in Code 913 performing data analysis on Nimbus–7 SMMR and DMSP SSMI microwave data in conjunction with atmospheric

moisture studies. In 1990 Bruce joined the NASA Climate Data System (NCDS) as a Senior Scientist employed by the company then known as SAR. While working on NCDS Bruce wrote data analysis software, format conversion software, data catalogs, and short, standardized data set descriptions in DIF for the NASA Master Directory and specified requirements for user interfaces for NCDS data holdings.

As NCDS evolved to become part of the Goddard DAAC in 1991, so did Bruce's work. He played a role in bringing in and supporting the first data sets archived and distributed through the DAAC (AVHRR Pathfinder, UARS, SeaWiFS, TOVS Pathfinder). He helped set up the interface to the Upper Atmosphere Research Satellite (UARS) Central Data Handling Facility (CDHF) to support operational data flows between the DAAC and the UARS CDHF.

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Bruce in a casual moment outside his office

Bruce has led the effort on science software integration and test (SSIT) for MODIS and AIRS algorithms that run at the DAAC, initially as a contractor then, since 1999, as a NASA civil servant. As of late Bruce has been involved with

the development and implementation of S4PM as the system that produces MODIS Level 1 and AIRS science data products operationally at the DAAC.

Bruce earned a Master of Science degree in Geography & Climatology from the University of Delaware with a Master's thesis on regional precipitation patterns. He is married and has two teenage daughters.

### ***Congratulations***

to Long Pham and his wife Trang Dinh. They are expecting a baby in early August 2002.

### ***Farewell & Best Wishes***

to Steve Liu who is leaving the DAAC and Goddard. He's off to the Treasury Department's Bureau of Alcohol, Tobacco, and Firearms.

Randy Barth reports that Steve came aboard in May 1999. He has led a major investigation into the needs of DAAC software, allowing for savings to the customer by using the less costly "Standard Version" of Oracle. He has made a number of improvements in the efficiency and security of the system. In one upgrade he led the data base administrators (DBAs) in researching import and export methods that cut 4 days off the original expectation for downtime by optimizing this part of the process. Through all of this, he approached all efforts with a smile and made collaboration a pleasure. He will certainly be missed. DBA Linnette Quick will step up to lead the DBAs in Steve's place.

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